

# THE UNDERSTANDING OF ICTS IN PUBLIC SECTOR AND ITS IMPACT ON GOVERNANCE

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**Abstract** The visions and goals for the use of ICTs in public sector are huge, both related to efficiency, effectiveness and for strengthening democratic functions. The realisation of such diverse set of goals requires a broad range of means and measures. However, do the managers really understand the many functions and roles ICTs have and how they should be governed? This paper discusses what functions that ICTs have in the public sector, and analyses existing ICT governance approaches in the Norwegian government. Our findings do indicate that there exist a mismatch between the functions implicit in the objectives that are stated for eGovernment and the way ICTs are governed. This mismatch, can, at least partly, be attributed to an inadequate understanding of ICTs and its many functions.

## Keywords

eGovernment, ICT Governance, ICT management, organisational functions.

## 1. INTRODUCTION

In the past, computers was conceived as a tool or instrument that could support or replace human work in rather controlled and easy-to-understand ways. To day, we know that the collection of hardware, software and systems that we have labelled ICTs have many dimensions and perspectives and are not at all easy to manage. We have experienced that the way ICTs is governed is not adequate, not least in public sector, see e.g. Heeks (2006), Grönlund (2009), Wimmer (2002). There are many reasons for that; we believe that one reason is a limited knowledge of the very nature of ICTs and how they should be managed in various organisational contexts. More precisely, we argue that there is a mismatch between the goals that are stated for eGovernment and the way it is governed, which can be attributed to an inadequate understanding of the various functions and roles of ICT in government.

While much research has addressed on the relationship between IS development and organisation consequences of ICT, this paper will discuss the relation between the various conceptualisation of ICTs and how they are governed. Following Orlikowski and Robey (1991), we held that ICTs have both material and social properties, being physical and socially constructed by subjective human actions. In a functionalist paradigm, ICTs can be seen as a tool which is used to further some organizational goals. By adopting an interpretative paradigm, we can view ICT in its social setting, seeing the world as a social construct (Hirschheim 1986). Computer-based systems are in this view a form of social organization, which is not at all neutral (Kling 1987). Similarly, Orlikowski and Iacono (2001) argue that ICTs are not just tools, and they suggest a number of different conceptualisations.

Without subscribing to these specific conceptualizations, such analysis illustrate the many

functions and roles that ICTs may have in organisations, not to say in the government. We would expect that such variety should influence the actual ICT management approaches and practices, also in government ministries. However, when e.g. analysing e-government policy documents, we find that there are stated many different ICT related goals and objectives which build on distinct assumptions about the character of the technologies to be applied (Jansen and Jacobsen 2011). However, the same documents contain few adequate means and measures to help achieving such goals, which we believe can be attributed to a lack of deeper analysis of how the use of ICTs may create the desired effects. Some of the stated goals may even be conflicting if not the underlying assumptions are well understood. The aim of our study is to contribute to a better understanding of how ICTs are conceptualized in government organizations, and how these correspond to current management practices. Our research questions are:

- 1. What are most typical ICT goals, means and measures in the different ministerial sectors**
- 2. What are the dominating understanding of ICT in terms of stated ICT-functions and roles**
- 3. Are there any relations between ICT management practices and the dominating understanding of ICT in the different ministerial sectors?**

### **1.1 Structure of the paper**

First, we will briefly discuss different perspectives on technologies as well as on organisations, and the possible links between technology and organizational structure, leading to a framework for analysing the functions and roles of ICT in organisations. Next, we present and analyse our empirical data that are collected in a study of governance practices in the Norwegian government, concluding by a discussion of what our findings may imply for IT-governance in public sector.

### **1.2 Research approach**

This study is based on an inductive and explorative research approach, aiming at identifying important factors that may help understanding challenges related to IT governance. A short literature review has been conducted to explore how ICTs are conceptualized in eGovernment documents. The empirical base has been the Norwegian government ministries and their subordinate agencies. We have analyzed their use of ICTs and more specifically their ICT governance practices. Our data have been collected from (1) the ministries budget documents and the ministries assignment letters to selected subordinate agencies, (2) relevant white papers and government reports and (3) interviews with key officers representing the various ministries. The data result from interpreting the budget document and assignment letters, in analysing what goals that are defined and the type of measures that are stated. We have in particular identified texts that describe ICT-related goals, means and measures and what type of management approaches that are applied. When interviewing managers in the ministries, we have discussed our interpretation of the data. Our informants have also been invited to comment upon our analysis.

## **2. Theoretical perspectives**

Below we will discuss different theoretical perspectives for understanding the link between ICT use and organisational functions, leading to a framework for analysing the relationship be-

tween stated goals in eGovernments and how governance is being conducted.

### **2.1 An objectivistic perspective on ICT**

In information systems research, the objectivist approach to technology is rather common, but not necessarily accurate. By presuming that technology is an object capable of having an impact on social systems, such research treats both technology and organization structures as objects. Kling (1987) describes the "tool" view of information technology as: "A computing resource that is best conceptualized as a particular piece of equipment, application or technique which provides specifiable information processing capabilities". He argues that such a view conceives information technology independently of the social or organizational arrangements within which it is developed and used. The objectivist approach overstates the importance of technology's material characteristics and ignores the social interpretations and actions that may modify the impact of particular software systems or hardware configurations. By contrast, the subjectivist approach to information technology is typified by those assuming a "social action" perspective on information technology and that the same technical solution may have various effects in different organisations (Orlikowski and Robey 1991). In a traditional, objectivistic way (Ritchie and Brindley 2005) define ICT as "the array of primarily digital technologies designed to collect, organise, store, process and communicate information within and external to an organisation". They points to that ICT can fulfil a number of business needs, such as strategic, operational or marketing needs, or a combination of all of them.

### **2.2 Interpretative approaches to understanding ICT**

Kling and Scacchi (1982) in opposing the traditional "tool-perspective", developed the concept of "web models" of computing in contrast to what they saw as the dominant "discreteness" model of computing. In addition to functional capabilities, computers are also social objects which may be highly charged with meaning. They thus held that computer-based systems are a form of social organization, which is not at all neutral. From their perspective, information technology is more than just the tools deployed on the desktop or the factory floor.

Zuboff (1988) make an important distinction is the difference between *automation* and *informating*. The term *informating* was coined in her book "In the Age of the Smart Machine", where she points to that it is the process that translates descriptions and measurements of activities, events and objects into information. By doing so, these activities become visible to the organization. Informating has both an empowering and oppressing influence. On the one hand, as information processes become more powerful, the access to information is pushed to ever lower levels of the organization. Conversely, information processes can be used to monitor what Zuboff calls human agency. She thus illustrates how same technical solution may be understood in different ways, depending on e.g. where you are in an organization.

In the last 15-20 years, we have seen lasting importance of networks and in particular Internet as a mean for communication and collaboration between humans, as is symbolized by concepts like groupware and Computer Supported Cooperative Work (CSCW), which emerged as separate fields in the early 90'thies. Interestingly, Orlikowski (2000) shows through her study of the use of a specific computer application in a large organisation, how the same technical solution

(a groupware system) was interpreted very differently by different groups of employees in the same organisation. By identifying four different technologies-in practises, she show how we better can understand how and why people are likely to use their technologies and with what (intended and unintended) consequences in different organizational and technological conditions.

Another approach to understand the multidimensional character of ICT is presented by Orlikowski and Iacono (2001). Based on their coding of a number of research articles, they identified 14 specific conceptualizations of information technology. It may be disputed whether their specific conceptualizations, being extracted from how researchers have conceptualised ICT in research, really reflect how ICTs actually are used and understood in organisations. Their analysis does, however, nicely illustrate that ICTs and their application can be interpreted in different ways, and we acknowledge their insightful contribution to a better understanding of the IT artefact. This type of analysis is even more important when we are studying the increasingly use of social media, which often have different functions and fulfil distinct roles in various organisational settings. This clearly shows how the same or very similar technologies are being understood very differently across organisations and in society at large; underscoring that also interpretative approaches are necessary.

### **2.3 Theories on the link between organisational functions and use of technology**

These few examples on different interpretation of ICT use outlined above illustrate that a restricted functional perspective only represent one dimension of ICT, while e.g. a informing or a technology-in-practise perspective show that one technology has potentials for many organisational functions and roles, some of them not necessarily clearly understood and predicted beforehand. Thus, different perspectives of ICT usage are closely related to the understanding of the functioning and structure of an organisation. Crowston and Malone (1988) are suggesting four different perspectives on organisations: *rationalist*, *information processing*, *motivational and political*, which can be used to interpret organisation structure. While the rationalist perspective assumes that organizations are composed of rational agents, operating towards some defined goals, e.g. efficiency. The information processing view shares many of these characteristics, but focuses instead on the organizational processes and communications patterns of the firm. The motivational perspective recognizes that workers may have different interests than the management of an organization, but typically assumes that these goals can be matched by properly designing the jobs of individual workers. The political view assumes that different groups within, the organization may have conflicting goals that can not be reconciled. Power determines which group achieves its goals, and IT may be used as a means to increase power.

Similar perspectives are presented by Dahlbom and Mathiassen (1992), claiming that there are (at least) three approached to understand develop and use systems in organisations; *hard*, *soft and dialectic* system thinking. “Hard” system is conceived as a hierarchically organised set of element, usually developed through a functional analysis, emphasizing ordering, stability, consistency and completeness etc. At the contrary, “soft” system thinking emphasizes that systems and organisations are shaped by our experiences from using them. We see different things, have different perspectives and structure the world differently. Interpretation then becomes important to understand how systems and organisations should be conceived and designed. Their third,

“dialectic” thinking departs from the soft thinking in emphasizing that multiple view and perspectives do exist at the same time. However, it differs in that it emphasizes that different perspectives are expressions of irreconcilable conflicts and power struggles. The claim of this approach is that we need to think in terms of contradictions in order to understand, explain and control change, implying that we have to identify interests, roles, structures, and processes in organisations. These perspectives are not mutual exclusive, but rather coexist in an organisation and imply varying and partly conflicting conceptions of ICT functions and their governance.

#### **2.4 Different functions and roles of ICTs in public sector**

The discussions above, which shows that there are many different understandings of what functions and roles how in organisations, have not addressed the role of ICT in public sector in particular. Even if public organisations do resemble a number of similarities to other organisations, there are some specific characteristics of the public sector that may influence the way they use ICT, which we will discuss below. Government agencies have a large variety of functions. One overall responsibility is to ensure the fundamental rights as democracy, openness and transparency, privacy and to improve citizen’s quality of life.

By reviewing a selection of documents on eGovernment, we have identified a number of ICT functions and roles that are typical in the literature. For the purpose of this paper we have grouped them into the following metagroups: i) *tool*, ii) *control and management*, iii) *service*, iv) *information and knowledge management*, v) *interaction and collaboration*, and vi) *information infrastructures*. Below we describe these metagroups in more detail

The *tool* function, as e.g. the traditional office automation and case handling functions. ICTs are here usually regarded as value-neutral artefacts, expected to do what its designers intended them to do, corresponding to Orlikowski and Iacono (2001). A tool, therefore, has no value beyond its capability to support the necessary production or administrative processes. In this perspective, the technology is primarily understood as a technical matter that is separate from, but controlled by human actors (Kling 1987). Tools are usually neither complex nor very flexible, and require limited, or mostly moderate organizational integration.

Somewhat related to this category is the control and management function, where ICTs are used for reporting, supervision, monitoring and controlling purposes, i.e. in collection of data on performance of the individual public agencies. Such uses of ICTs are normally characterized by moderate complexity, implying limited need for flexibility and organizational integration. It has in that way similarity with the tool function, but support specific management approaches.

Both functions represent primarily a rational and functional perspective on technology, and hard system thinking. They can often, but not always be linked to an organisational imperative, in that they need not lead to substantial organisational changes. Such functions will be used in all parts of an organisation, but mostly for administrative and management tasks and will in particular be linked to efficiency objectives.

Our next category is the *service function*, where ICTs are integrated in the core production, which in the public sector mainly implies activities related to the provision of information services. An essential characteristic is that service provision involves ICT-based communication with actors outside the organisation, and includes both technical and organizational elements.

ICT-based services will imply a significant level of complexity and flexibility, and organizational reorganisation is crucial (Ritchie and Brindley 2005).

Further, we find that ICT is being used extensively in information and knowledge *management*, which comprises a range of strategies and practices used in an organization to identify, collect, manage, distribute data and enable adoption of insights and experiences by facilitating the sharing of knowledge. Examples in public sector are data collection and analysis in resource management, GIS systems, data on climate change, pollution, petroleum reservoirs, etc. This perspective differs from the tool function in even if it include data handling processes that can be automated, it involves intellectual activities based on insights and experiences either embodied in individuals or embedded in organizations as processes or practices. We see that both can be associated with an information processing perspective, and a motivational perspective, too.

Out next category include systems that support *interaction and collaboration*. ICTs are increasingly being used for communication, interaction and cooperation, both internally and externally. Typical examples are groupware systems and computer supported cooperative work, which implies changes in division of tasks and organisation of work. This use of ICTs is less structured and it requires significant organizational flexibility (Bratteteig 2004). It is also seen as a way that citizens and organisations can interact with and influence on public sector. The development and use of *social media/web2.0* represent a further development of these functions, and offers quite new ways of using ICTs for collaboration and co-creation. Even though these types of use have similarities with CSCW applications, they differ in that such systems are open to many and its use open is not controlled by any organisation.

As [*information*] *infrastructure*, ICTs comprise the basic technical and organization capabilities necessary for supporting application systems and solutions across organisations and society at large. In addition to the technical systems and networks, it includes basic data resources that many public agencies rely on in its daily work. An information infrastructure must be open, standardized and flexible in order to support the large variety of systems and services that run on top of it (Hanseth and Lyytinen 2010). In particular, infrastructures are “sunk into” the organisation (Star and Ruhleder 1996) and shall be used by a large variety users and fulfil many different, partly conflicting functions and roles, Thus, ICTs as infrastructure implies a high degree of complexity and a need for organizational adaptation.

**Table 1: Different categories of ICT functions and roles and associated perspectives on ICT**

Metagroup	Typical Functions and roles	Perspectives on ICT
<b>Tool</b>	Office Automation , Case handling, etc.	Rationalistic and mostly hard systems thinking
<b>Control and management</b>	Supervision , Auditing, Inspection	
<b>Service provision</b>	ICT s integrated in products and services	Includes also information processing, and soft systems thinking
<b>Information &amp; Knowledge Management</b>	E.g. data collection and analysis related to resource management, GIS systems, etc.	
<b>Interaction &amp; collaboration</b>	Groupware, CSCW-systems, Social media,	Includes various perspectives and many way of thinking
<b>Information Infrastructure</b>	Networks, support services, management of shared facilities etc.	

These different metacategories and their respectively perspectives are, however not mutually

exclusive in an organisation (rather the opposite), but we argue that they require different management approaches in planning and development as well as in implementation and operations.

How do these ICT functions relate to goals and objectives that are stated for eGovernments? When reviewing different national policy documents, we find rather ambitious visions and goals. E.g. Norway has defined these values and goals: i) democratic values, ii) efficiency, iii) rule of law and proper case administration and iv) quality and integrity, v) innovation in private sector. Thus, by using the overall eGEP Measurement Framework Analytical Model (EU 2006), but including innovation as a fourth goal, we may illustrate these relationships between goals, indicators and ICT functions and roles as in table 2:

**Table 2: Relation between objectives, indicators, effects and ICT perspectives in eGovernment**

Overall goals	Indicators (examples)	Public value	Dominating ICT functions and roles*)
<b>Efficiency</b>	Financial gains Better organisational structures	Financial & Organisational value;	Tool Control and management
<b>Effectiveness:</b>	More inclusive public services increased user value & satisfaction	Constituency Value	Service provision Knowledge management
<b>Democracy</b>	Openness, Transparency Participation, citizens empowerment	Political Value.	Interaction and collaboration Service provision
<b>Innovation</b>	Better access to information	Value creation in society	Knowledge management Service provision

\*) Information infrastructures are important for all type of goals

We may then assume that governance structures will be influenced by the type of organisations and in particular the managers understanding of ICTs functions and roles. This type of influence will not be uniform, but rather having great variation, also being influenced by other factors.

### 3. MANAGEMENT OF ICTs IN NORWEGIAN GOVERNMENT

The Norway is a highly computerized country, and so is the public sector. However, the management structure of the public sector is not particularly influenced by ICT, as our public administrative policy is still characterized by rather strict sectorization and line responsibility (Jansen 2008). This means that each ministry is responsible for their specific choice of governance approach. Thus, the organizational and management structures resemble a silo; vertical integration within and horizontal separation across ministerial areas of responsibility. The Minister for Administration and reform coordinates public sector reform and is responsible for the government's administrative policy, including ICT policy. One directorate has the mandate to act as an initiating agency, promoting coordination and cooperation. This implies that there are only few overarching principles and methods for the governance of ICTs and each ministry has a large degree of freedom when it comes to the choice of IT governance approach. We may assume that there is significant variation of management approaches across the different sectors and areas of responsibility, implying that they are utilizing ICTs in different ways.

#### 3.1 Current ICT management practises in Norwegian ministries

During 2010 and 2011, we have collected data on how ICTs is being managed in the various ministerial sectors in Norway, focusing on how each ministry carry out their individual ICT

management. We have identified ICT-related goals and accompanying means and measures that are defined in steering documents (assignment letters etc.), complemented by interviews in each ministry and some subordinate agencies. Below we present some of our findings.

Table 3 shows the ICT goals in the different ministerial sectors (column 2), and their ICT focus in management (column 3) and the primary ICT functions and roles (column 4). The identification of ICT related management approaches has been done by i) surveying ICT usage within the different areas of responsibilities, ii) assessing the specification of ICT means and measures that are found in the budget documents and assignment letter to subordinate agencies, iii) how the ministry representatives in interviews describe how they control their subordinate agencies. The categorization of ICT functions and roles are according to how ICT goals are specified, supplemented by analysing the various core activities and the role ICTs have in such activities.

**Table 3: ICT goals, means and dominating ICT functions in Norwegian government (selected)**

Ministry	Primary ICT goals in the sector	ICT-management focus	Dominating ICT functions and roles
Labour and Welfare	Increase quality and efficiency in case handling and control functions.	Limited ICT focus, no specific goals or means	Office aut. & case handling Control and management Service provision
Government Administration, Reform	Strengthen infrastructure functions and ICT-based collaboration. Quality in service provision.	Well-defined ICT-goals, infrastructure focus, ICT agency and strategy	Information infrastructure Interaction and Cooperation Service provision
Finance	Increase quality and efficiency in service provision, case handling, Strengthen infrastructure function	Well-defined ICT-goals, infrastructure focus, ICT agency	Service provision Control and management Information Infrastructures
Health and Care Services	Strengthen CT-based interaction & collaboration. Improve infrastructure Increase control.	ICT goal and strategy for interaction, with private actor	Interaction and Cooperation Information infrastructure Control and management
Justice	Increase quality and efficiency in case handling. Strengthen collaboration,	Significant ICT and interaction focus, ICT goals/strategy	Interaction and cooperation Office Aut. & case handling Control and Management
Education and Research	Increase quality in service provision. Strengthen infrastructure functions. Better control	High ICT service and infrastructure focus, ICT agency	Service provision Information infrastructure Control and management
Culture	Increase quality in service provision Stimulate cooperation. Improve infrastructure functions	ICT goals and strategy. Service and infrastructure focus, ICT agency	Service provision Information infrastructure Interaction and Cooperation
Environment	Increase quality in infrastructure functions and service provision Stimulate information sharing	Significant ICT and infrastructure focus, ICT strategy and ICT agency	Infrastructure Service provision Knowledge management
Trade and Industry	Strengthen infrastructure and services. Better control	ICT goals, infrastructure and service, ICT agency	Information Infrastructure Service provision Control and management
Transport and Communication	Strengthen infrastructure support and cooperation. Better supervision and control	Some ICT focus, ICT strategy in the transport sector	Control and management Interaction and Cooperation Information infrastructure



Our first research question is: *What are most typical ICT goals, means and measures in the different ministerial sectors?*

Column 2 and 3 in table 3 describe the main ICT goals and -means in each sector. We found that these goals and measures are to a large extent integrated in their general policies. Few ministries explicitly mention ICT in their budget document, and ICT-related goals or means are vague and usually not operationalized to any significant extent in their assignment letters. Less than half of the ministries specify measurement indicators for the use of ICTs, and such indicators are for the most part qualitative and vague.

We see furthermore that less than half of the ministries have defined a general ICT-plan or strategy that affect the whole sector. Those ministries that have a coordinating ICT-body do also stimulate sector-wide cooperation and coordination. This illustrates important differences between the ministries regarding their IT governance styles. However, other ministries argue that a sector-wide strategy is not considered relevant because the individual subordinate agencies have defined their own strategies which the ministries would follow up and monitor. Some ministries have adopted a softer management approach through more informal forums or coordinating mechanisms, where the subordinate agencies can congregate and discuss issues of mutual interest, i.e. the interoperability of different ICT-systems.

Our second research question is: *How are the stated goals and objectives understood in terms of ICT functions and roles?*

Column 4 in table III shows our assessment of the 3 most important ICT functions and roles within the individual ministerial sectors, based on how they have described ICT goals, means and measures. We find that there is a large variation across the ministries. Office automation along with control and management functions seem to be important/most important for 11 ministries. This is not surprising, as we would expect that ICTs primarily are used for supporting administrative and management processes. It is more interesting that the cooperation and interaction functions as well as infrastructure are explicitly mentioned as important by 9 ministries, while the service function are mentioned by 7 ministries. Knowledge management is listed as important in only 5 ministries. Interestingly, the use of social media is not mentioned by any ministry, contrasting the overall goals where ICT is seen as an important mean to strengthen democracy and citizen participation.

Our third research question is: *Are there any relations between ICT management practises and the dominating understanding of ICT in the different ministerial sectors?*

Our data show that the different ministry's ICT governance approaches, in terms of defining goals, implementing strategies and means have significant variance. Our interpretations indicate that their understanding of ICT functions and roles may explain at least parts of this diversity. As there are a lot of similarities between *tool* and *management and control* functions, we will below cluster these functions into a larger *tool+* meta-category. Furthermore, as we may assume that knowledge management imply the same perspective as that of information infrastructure in collecting and sharing data, we will merge these two into another meta-category.

Table 4 shows that in those sectors where the tool perspective are dominating, many of the ministries appear as having a low ICT focus in their management approach. Contrary, in those

sectors where ICT-services and information infrastructures perspectives seem important for their ICT-use, the respective ministries do have a strong ICT-focus.

**Table 4: The correspondence between ICT management focus and most important ICT functions**

Dominating ICT functions ICT-focus in management	TOOL: Office Aut. and control	Interaction and cooperation	ICT-based Ser- vice provision	Information infra- structure & K M
No or low ICT focus	6	6	1	1
Strong ICT focus	2	3	5	6

When analysing the use of overall management instruments in detail (Jansen and Berg-Jacobsen 2011) we find that those ministries who emphasize a tool perspective, also practise a rationalistic management approach. On the contrary; in the sectors where the service and interaction functions dominate, these ministries' management approaches are mostly in accordance with an information processing perspective. Similarly, the knowledge management and information infrastructure functions correspond with political perspectives, where one accept that there are many, partly conflicting interests and goals that have to be handled in constructive ways.

Thus, returning to our initial claim that there is a mismatch between the goals that are stated for eGovernment and the way it is governed, which can be attributed to an inadequate understanding of the various functions and roles of ICT in government. Table 5 below shows the relation between overall goals and the specific ICT functions mentioned by the different ministries. We see that in those ministries where efficiency is the primary ICT goal, the tool perspective is dominating, while in ministries where effectiveness and citizens' needs are the primary focus, service and infrastructure functions are dominating. However, few ministries focus on democracy or innovation as specific goals for their use of ICTs.

**Table 5: The relation between states objectives and the conceptualization of ICT functions**

ICT functions	Tool	Interaction and co- operation	ICT-based Service provision	Information infra- structure & K M
Overall goals				
Efficiency	8	3	1	2
Effectiveness	3	5	4	4
Democracy	0	0	0	0
Innovation	0	1	1	1

Thus, we find some correlation between the ICT goals that are stated in the individual ministries and their understanding of ICT functions. However, when considering the government in its entirety, we find a weak connection. The overall policy documents states that ICTs should help improving the quality and accessibility of services through sharing of resources and stimulate more efficient cooperation and division of tasks. We would expect that ICT governance should focus on service provision, information management and infrastructure functions and not primarily on efficient use of ICTs for case handling, control and management purposes. But our data strongly indicate that less than half of the ministries do have such focus in their ICT governance approaches. Our conclusion is thus that the Norwegian government lacks an overall ICT policy including efficient means and measures that can strengthen more strategic uses of ICTs.

This may be illustrated by The Norwegian Population register, which in the past was designed and has been used by one agency. It is now being regarded as an infrastructure component, being used by a growing number of both public agencies and private organisations. Its data quality and availability are not at all adequate. But so far, no adequate governance model based on a more holistic and interactionist perspective has been implemented. There is, however a growing understanding of the existing management challenges, and changes both in its organisation and management structure are being considered. We believe that political and dialectical approaches is becoming more important, as the degree of interaction and information exchange is increasing, along with that traditionally individual information systems are increasingly becoming part of a common information infrastructure.

#### 4. CONCLUSIONS

Our findings reveal a diversity regarding how ICTs are understood and governed in the Norwegian government, but at the same time they show that few ministries focus on other goals than internal efficiency and quality in their management approaches. This picture can be attributed to several reasons. Firstly, many ministries do have a limited understanding of how to realise other values from ICT investments than efficiency. Secondly, such other goals require that adequate means and measures are implemented across ministries, which is difficult to achieve.

There are, however other factors than the ministries' lack of ICT maturity that can explain their IT governance approach, not least that the specific characteristics of the individual sectors and their use of ICTs may imply different governance approaches. Furthermore, their history of traditions and norms related to management principles do vary significant; some ministries have been rather unchanged for more than 100 years, while other are less than 10 years old. Lastly, this picture is rather dynamic, and our data represent only the present state, which most likely will change over years, such that the different ministries may gradually adopt new governance approaches accommodating the increasing importance of ICT in society.

Finally, we have to admit that the assessments of the dominating ICT functions and roles are not ambiguous, as one ministry may define different goals and apply varying measures and instruments due to that their subordinate agencies may require different management styles. Thus, there is a need for more research which can improve our analytical framework.

We will, however fully agree with the conclusions of Orlikowski and Iacono (2001) in claiming that ICT artefacts are by no mean natural, neutral, universal or given, as they are always embedded in some time, place, discourse, and community. Furthermore, ICT artefacts are neither fixed nor independent, but they emerge from ongoing social and economic practices in dynamic ways. Our overall conclusion is however that the top level management (and the politicians) in Norway lack an understanding of the many functions and roles ICTs have in the government, and what means and measures that are required to make the most of these potentials.

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